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ABSTRACT

This teacher's guide presents current scientific research on the process of human learning and stresses the importance of metacognition. Focus is placed on the integrated pair of concepts, emotion and attention, with analogies to traffic conditions being employed to aid understanding. Background information on human emotion and attention, a poster, instructions for the ten emotion and the five attention-related instructional activities, and handouts and overhead masters are included. (DDR)

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# Discover Your BRAIN

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# EMOTION AND ATTENTION

## *How Our Brain Determines What's Important*

Nancy Margulies
and
Robert Sylwester

Zephyr Press®
Reaching Their Highest Potential
Tucson, Arizona

Emotion and Attention
How Our Brain Determines What's Important

Grades 5–8

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# Introduction

One of the best gifts we can give our students is the opportunity to learn *how* to learn, since understanding our own cognitive processes (commonly called *metacognition*) is an important key to becoming a successful adult. To help your students learn how to learn, you can tap the power of all the exciting information that's emerging about our brain and its processes. Scientists are truly discovering answers to many processes that have long mystified our profession, and emotion and attention are certainly two such integrated central processes.

This learning kit on emotion and attention is a companion kit to one on the closely related process of memory. You can use either kit by itself, but the combination provides the most complete exploration of the related cognitive systems. This emotion and attention kit provides you with:

**This booklet that contains**

- *background information on human emotion and attention*
- *instructions for emotion- and attention-related instructional activities*
- *handouts and overhead masters*

**A poster**

**An audiotape**

Begin by reviewing this booklet and familiarizing yourself with the current scientific insights about the process of human learning. Then lead your students in the activities related to the poster and audiotape. Use the handouts and overhead transparencies to instruct your students; you may intersperse the student-directed activities throughout, or you may have them choose several to conclude the unit. When possible, we have printed two activities to a page; feel free to copy these activities for your class, or laminate one copy of each activity to pass around. You may want to keep a card file of these activities and add your own activities from one year to the next.

The text provides you with many useful analogies and illustrations that you can weave into your instruction over the year. Consider the value of beginning the school year with an instructional unit that develops a deeper understanding of emotion and attention, and their role in all the learning and problem-solving activities that will occur during the year, but realize also that you can easily integrate the study of emotion and attention into any curricular investigation. However you explore emotion and attention with your students, it's important to encourage them to translate the general principles that underlie these cognitive systems into an effective, efficient personal integrated system that reflects individual students' interests, abilities, and preferred learning styles.

We tend to think of emotion and attention as two separate concepts, but cognitive research suggests that they're really two sides of one coin—the integrated pair that provides us with a sense of and focus on what's currently important.



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# Emotion and Attention

Think of the biology of our integrated emotional and attentional system as being something like a car's visible and hidden systems. The visible ignition key activates a variety of unseen (and for most of us, unknown) automotive systems. Most of us are aware only of the characteristic ignition sound, the lighting of the instrument panel, a suddenly turned-on car radio, and the engine's vibrations—and not what's occurring under the hood, where gasoline is coursing through the engine.

This limited knowledge, though, is enough for us to consciously shift, accelerate, steer, and enter traffic (risky as it may be). Minutes later, we may be out on the freeway, driving on cruise control, again blissfully unaware of all the specific adaptations the engine automatically makes to maintain a constant speed as the car travels over hills and various pavement surfaces.

Traffic conditions may periodically require a temporary shift off cruise control—to consciously control and focus in order to pass or avoid a collision. The car trip thus becomes a collaboration between the movement systems of an unconscious car and a conscious human. It's a good arrangement—automatically take care of normality to conserve conscious attention for abnormality.

Our emotion and attention system functions similarly. Emotions contain conscious, visible (or mental) elements that we commonly call *feelings* and *body states* (such as shivers and heart palpitations), and unconscious, hidden elements throughout our body and brain that identify and respond to our survival needs. We thus have no conscious awareness of the brain and glandular activity that awakens us in the morning, yet we get out of bed and begin the day (again, risky as it may be). Our emotional system then informs us of important opportunities and dangers across the day—information that often just seems to pop up in our mind (like things suddenly occurring in traffic). Our emotional system contains both an innate and learned sense of the importance of various elements that we continuously confront—danger, fleeting opportunities for resources, strong personal likes and dislikes. Thus emotionally informed, we generally respond by temporarily increasing or decreasing our attentional energy on the immediate situation before going back to the more relaxed unconscious normality of biological cruise control. Our integrated emotion and attention system thus arouses us, then focuses our attention. Nothing happens without arousal and focus, just as in a car nothing happens without ignition and acceleration, even if most of us don't understand them. (This metaphor is repeated on the audiotape.)

Let's explore arousal, our emotional system, first.



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## The Importance, Purpose, and Nature of Emotion

Emotion has long been a problem for educators. Schools are organized to work with groups of students in a smoothly regulated and reasonably quiet setting, and it's difficult at best to regulate the emotions of individual students. Further, schools seek precise, measurable reports of achievement, and students can report the factual knowledge they learned with far more precision than they can their emotional reaction to their studies; "George Washington was the first president of the United States" is a far more precise and evaluative student response than "I enjoyed reading Washington's biography."

The result of such organization is that we've tended to communicate a perspective that *real* school is for learning, and recess and a few subjects such as the arts and PE are for emotion. The latter are generally vulnerable to being cut when funding is cut. We further insulted our magnificent emotional systems by negatively defining much of classroom emotion as *misbehavior.* In reality, all genuine emotions are personally healthy and positive, even though they may affect others negatively, since they emerge to deal with real body and brain issues.

Recent cognitive science developments suggest that it is inappropriate to devalue emotion. Emotion drives attention, which drives learning, memory, problem solving, and almost everything else we do. It's not biologically possible to learn something that we're not attending to, and it's generally not biologically smart to attend to things that don't mean anything to us. Teachers thus shouldn't harass students who ask the very intelligent question "Why do we have to learn this?" By not exploring the role that emotion plays in learning and memory, our profession has fallen decades behind in devising useful instructional procedures that incorporate and enhance emotion. This kit is thus partially about catch-up time.

Daniel Goleman (1995) laid out the problem and the educational challenge of emotion in a thought-provoking, well-written, nontechnical book on recent dramatic developments in emotion research, *Emotional Intelligence: Why It Can Matter More Than IQ.* It is now available in paperback, and we encourage you to read it since it provides additional useful information in your search for ways to better incorporate emotion in instruction.

## Multiple Emotions

Over the last decade, our profession has embraced the concept of multiple intelligences, proposed in the theoretical work of Howard Gardner (1983), Robert Sternberg (1988), and others. We realized that our brain would need different systems to process such disparate cognitive functions as music and movement, that the one-size-fits-all IQ concept of intelligence just doesn't match our experience with how students learn.

Despite this we tended to think of emotion as a single unified system that processed all emotions—joy, anger, pain, anxiety, and so on. Scientists identified the



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*limbic system* as our brain's centrally located emotional processing center (see glossary, page 15). But scientists are now discovering that separate neural pathways and molecular systems process our various emotions, so they are proposing various, multiple-emotion systems.

Although no conclusive classification system has yet emerged, similarities are apparent in the various proposed systems. Figure 1 identifies eight basic emotions that appear in many current classification systems. Six focus on what has occurred and two on what might occur. Some basic emotions are the reverse of others, and some seem to exist along a positive-negative continuum.

## Figure 1: Basic Emotions

**Emotions** that focus on

**What has occurred:** Surprise
Acceptance - Disgust - Anger
Joy - Sadness

**What might occur:** Anticipation
Fear

(Display overhead 1, page 33, for this discussion.) We obviously experience a wider range of emotions than these eight. Think of emotional blends as similar to intelligence blends. For example, although musical and bodily-kinesthetic intelligence are separate in Gardner's theory, playing a musical instrument requires them both. Similarly, think of *alarm* as a blending (or simultaneous activation) of the fear and surprise systems; *anxiety* as a blending of fear and anticipation; *love*, of joy and acceptance; and *guilt*, of joy and fear.

The color continuum is a nice metaphor to explain emotion. If we travel the color spectrum, as it gradually moves from red to violet, we can stop occasionally and identify discrete primary and secondary colors. Yet, context, hue, and brightness can affect our perception of such a discrete color (it may appear red against one background and orange against another).

Emotion is similar. Stereotyped facial and vocal expressions help us to identify discrete emotions (such as the eight listed earlier), but an emotion's intensity and meaning will vary among people and situations. The shifting emotional range of a typical classroom creates a richly textured emotional symphony, one that constantly changes its tone, intensity, and rhythm (along the pain-pleasure emotional continuum that characterizes the message of much of our music).



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Emotions just happen. Falling in love or getting angry isn't something that occurs consciously, deliberately. We can set up situations (such as playing a game, drinking alcohol, or inviting friends over to dinner) that we know will probably trigger certain preferred emotions, but we can't control the emotions that the event actually triggers—and we generally know when someone is faking an emotion. This lack of conscious control means that our emotions can dominate consciousness and reason. For example, if we feel depressed, our feelings usually don't change when friends remind us of all the factually positive things in our lives. Our emotions more often overwhelm factual logic than the reverse. Anatomically, the projections from our emotional systems to our factual and thoughtful cognitive systems are much stronger than the projections from our cognitive systems to our emotional systems. It's possible for reason to overrule an emotional decision ("we can't afford a new car," for example), but it usually doesn't change how we feel about the situation.

But emotions involve more than neural networks. Our brain functions through sixty different neurotransmitter and hormonal systems that distribute information among our 100 billion neurons, and between brain and body systems. Most of these are peptides, relatively large information-carrying, multipurpose molecules that play key roles in our emotional life. The endorphins, which reduce pain and increase pleasure, are perhaps the best known brain peptides. Peptides are released by neurons and a variety of body structures, but can also move through intercellular fluids to neurons in other parts of our brain. Candace Pert (1997), who made major discoveries about the biochemistry of emotions, calls our brain "a bag of hormones." That these emotion-oriented peptides are found in bodies and brains of all animals is evidence of their importance to life.

## The Neurobiology of Fear

Joseph LeDoux (1996) has worked out the neural pathways that regulate fear, the best understood emotion. Fear is perhaps our most important survival emotion (and part of the real world of many students); the discussion below explains how it functions. Researchers expect to locate similar kinds of pathways for other emotions. (Display overhead 2, page 35, for this discussion; this and the following information is repeated on the audiotape.)

When we are confronted by situations in our environment that don't have a sense of immediacy, a relatively slow, rationally oriented pathway that travels through the cortex reflectively analyzes the situation and responds. For example, while walking down a street, we continuously select and translate various sensory inputs into ignored and remembered objects and events. A limbic system structure called the *hippocampus* is important to this process, since it regulates access to factual memories (much as a card catalog contains the code for the location of library materials).

Walking across the street is another matter. To unhurriedly analyze various elements of the car rapidly moving toward us may mean that we'll die informed. Our brain's fear system is designed to rapidly, reflexively respond to imminent danger, often beginning the process before we are even consciously aware of the danger.



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Two small, almond-shaped limbic system structures called the *amygdala* play a key activation role, so we can think of the amygdala as our brain's 911 system, which can (and often with only limited information) rapidly deploy various powerful conscious and unconscious response systems. It's also been called the *fear button.*

This rapid, reflexive pathway involves sensory-thalamus-amygdala-hypothalamus-pituitary gland-adrenal gland circuitry. It initiates a stress response that is designed to provide a short-term, high-energy response to a physically threatening situation. The car metaphor presented earlier describes a brief, rapid acceleration to pass another car or a slam on the brake pedal to avoid a wreck. The stress response involves changes in our circulatory, muscular, endocrine, and immune systems. One such response is that the adrenal glands (located just above the kidneys) release stress hormones (such as cortisol) that rapidly move throughout our body and brain via the bloodstream and activate fight-or-flight behaviors.

The stress hormones also travel up to the hippocampus, our brain's pathway to rational thought. The hippocampus responds by signaling the hypothalamus to slow down the further release of stress hormones (recall the stress response is meant to be short term, much like accelerating to pass another car). The amygdala (speed up) and hippocampus (slow down) thus combine to regulate our stress hormone release pattern. If the amygdala notes a continued fearful situation, however, it will signal for continued stress hormone release. The amygdala and hippocampus can thus operate in opposition to each other if the stressful situation continues. The amygdala is the more powerful because it controls our brain's survival systems, while the hippocampus regulates the less important rational factual memory and problem-solving processes in the cortex (and especially in the frontal lobes that can control emotions and encourage unselfish behaviors).

With persistent stress, the hippocampus will eventually lose its ability to slow down the release of stress hormones and to perform its long-term memory functions. Severe temporary stress can shrivel hippocampal neuron dendrites (which receive information from other neurons), and chronic stress can even irreversibly destroy key memory functions—without our conscious awareness of why we're having learning and memory problems.

One result of excess stress is depression, and depressed people often suffer memory impairment. Alzheimer disease involves destruction of hippocampal neurons. The amygdala is not negatively affected by stress hormones, and stress may actually enhance our emotional memory of a fearful situation while it weakens our factual memory of the situation. We become fearful of something but aren't sure why.

While intellectual challenge (and even mild stress) can enhance learning, severe short-term and chronic stress shift us into a mode of operation in which we react to danger rather than think rationally about it. Just as continuous capricious acceleration and braking can eventually ruin a car, so chronically fearful home and school environments can biologically diminish a student's ability to learn and remember. A stressful school environment is thus biologically counterproductive.



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## Developing Emotional Intelligence

(Display overhead 3, page 37, for this discussion.) Emotion researchers suggest that it's possible to create a functional balance between emotion and reason that capitalizes on the strengths of each. Studies of people who have created such a positive balance in their lives have led to the identification of several elements that are critical to the people skills that lead to emotional intelligence.

1. **Intrinsic Motivation:** the self-starter's ability to persist in frustrating situations. This ability emerges out of an environment that encourages the discovery and exploration of interests and abilities. Such experiences create our self-concept (how we define ourselves) and our level of self-esteem (how we value that definition). Continuous informal evaluations that focus more on what we *can do* than on what we *didn't do* create a necessary climate of positive social feedback. Helpful programs are those that value and discuss feelings, that encourage multiple and cooperative approaches to problem solving, and that encourage self-assessment (such as portfolio assessments).
2. **Impulse Control:** the ability to delay decision and gratification. Regrets and apologies are a part of human life, and prisons are full of people who wish that they had counted to ten before acting. Our wary emotional brain often reads *immediacy* into situations that don't require an immediate response, that are better solved through reflective thought. Developing a pattern of assertive (rather than aggressive) response to difficult situations enhances impulse control. It's also good to reduce the tyranny of frantic school schedules whenever possible. Helpful programs are those that develop problem-solving skills and that focus on long-term projects with intermediate goals (so students can experience and appreciate things that develop slowly).
3. **Mood Regulation:** the ability to regulate moods (such as anger) so that distress doesn't reduce our ability to think, to reflect. The fast (fear) pathway focuses attention on survival at all costs, and this focus reduces the impact of the slower reflective pathway in behavior. There's a fine line between simply experiencing emotion for what it is and allowing it to dominate all our behavior. Although we may occasionally (and perhaps unfortunately) step over that fine line, it's probably worse to be so controlled emotionally as to never step over it. Helpful programs are those that teach students to understand and respect emotion without necessarily submitting to it, that provide a forum for venting positive and negative emotion, and that offer an opportunity to retreat from social interaction when emotion overwhelms.
4. **Empathy:** the ability to empathize, with a sharing, caring, and hopeful sense of how another person feels about something. Sympathy differs from empathy in that it's a kind-hearted recognition of the plight of another without the sense of sharing it that empathy implies. Empathy is an important social trait in that it leads to ethical and altruistic behaviors. Helpful programs are those that encourage constant open discussion of how things are going in order to


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help students tune into one another (to develop useful listening, looking, and responding conversation skills).

5. **Social Competence:** the ability to quickly size up and appropriately respond to social situations. Our complex social structure functions via our innate sense of cooperation, early experiences with adults and children, and a set of social rules (or manners) that might actually be quite arbitrary and culture driven. Manners, thus, don't come naturally but must be taught. Helpful programs are those that encourage the constant informal interactions that allow students to discover how others respond to their behavior and that specifically teach the social conventions a group must observe if they are to effectively work together. Activities such as cooperative learning projects, games, field trips, and reflective discussions help develop this skill.

The activities in this booklet suggest ways to help your students explore and enhance their emotional intelligence.

## The Importance, Purpose, and Nature of Attention

Our emotional system informs us that something important has occurred or is about to occur. This arousal allows our attentional system to quickly reduce its current sensory field, to focus on the important (the foreground), and to merely monitor or ignore the currently unimportant (the background). The background is generally composed of steady states, subtle differences, and gradual changes that don't carry a sense of immediacy. The frame on a picture, the zoom lens on a camera, the stage in an auditorium, and cosmetics such as eyeliner and lipstick are all technologies that help direct our attention—to separate foreground from background.

Attention disorders are a far more widespread disability than most of us realize. We tend to think mostly of the relatively few hyperactive students whose classroom behavior is generally very disruptive. Anxieties, obsessive-compulsive disorders, dyslexia, mental retardation, autism, and schizophrenia are other maladies that involve a reduced ability to appropriately establish, maintain, and shift attention. Medications and behavioral interventions exist to help those whose attentional deficits are related to chemical imbalances and learned inappropriate behavior patterns.

An effective attentional system must be able to (1) quickly identify and focus on the currently most important elements of the environment, (2) sustain its focus while monitoring the related elements and ignoring the unrelated, (3) access memories that aren't currently active but that could be relevant to the current situation, and (4) quickly shift attention when important new information arrives.

## The Neurobiology of Attention

Our sensory system is designed to passively receive information from the surrounding environment, principally molecules and rays that continuously bombard our specialized touch/vision/hearing/taste sensory receptors. This initial passive reception

is important because it allows our brain to unconsciously process a wide range of sensory information in its continuous search for things that might require immediate attention.

To simplify the selection process, our brain innately limits input to narrow ranges of information that contain the potentially most useful information (such as the narrow range of the electromagnetic spectrum that constitutes visible light and the ten-octave range of sound that we can hear). Further, our brain responds best to certain values within these ranges (such as loud sounds, moving objects, high contrast, the red side of the color spectrum, and obnoxious odors). We're thus biologically unaware of much potential sensory information within our environment.

Our frontal lobes consciously process the shift from passive to active attention. They control, fixate, and shift our attention as we determine background and foreground, and ways in which the current situation relates to previous experiences. Our short-term (or working) memory helps such a focus since it's essentially a buffer that allows us to hold a few units of information for a short period while we determine whether to go on to something else or to store the information in long-term memory. This limited attentional capacity can be helpful, since it forces us to seek out and focus on a relatively small number of important elements in a very large sensory field. Students with attention deficit hyperactivity disorder (ADHD) exemplify the problems confronted by people who can't easily reduce and focus their attentional field (no zoom lens, as it were).

Our attention system can simultaneously process noncompeting information (such as to look at a friend's face while listening to her), but we can't listen to two people talk simultaneously. Further, we tend to combine (or chunk) units of related information into a single entity (such as a face instead of separate eyes, ears, nose, and mouth). These properties allow our brain to quickly and effectively process a lot of information within a complex environment.

Our attentional levels vary in a ninety-minute cycle across twenty-four hours because of fluctuations in the levels of the neurotransmitters that regulate the system. The average levels of the cycles are highest in the morning after waking, which probably developed in our visually driven brain because attention is so important in the search for food after a night of fasting. Our attentional capabilities begin to decline in the afternoon and reach their lowest level late at night when sleep (the loss of conscious attention) becomes inevitable. We thus tend to do the things we have to do in the morning when it's easiest to maintain attention, and the things we want to do in the afternoon and evening, when it's more difficult to maintain attention without the emotional support that interest provides.

Experience suggests that at puberty, many young people's sleeping/waking times get pushed back a couple or more hours, and they enter a (perhaps extended) period that's similar to jet lag. Unfortunately, school starts while they're still psychologically asleep. All who have gone to work the morning after flying home over time zones should sympathize with the daily plight of these students. As we learn more about our brain and its cycles, educators will have to confront this and similarly complex issues.



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## Educational Implications

Our attentional system contains innate and adaptable properties. The powerful innate properties emerged so the system could focus and function quickly and decisively whenever our emotions signal danger or a fleeting opportunity (it's not smart to lose interest in an approaching predator). The adaptable properties emerged so that the system could also effectively focus on novel and less threatening situations—things we've learned to attend to (such as bus schedules) that aren't programmed into the system. Schools need to adapt their programs to students' innate attention biases whenever possible, and schools should help students learn to attend to things that aren't biologically programmed into the attentional system, but are personally and culturally important. The activities in this booklet suggest ways to explore attention with your students.

# Glossary of Technical Terms

**Adrenal glands** — Located above the kidneys, these glands (among other things) release glucocorticoid (steroid) hormones during a stress response. Cortisol is one such hormone. It activates important body/brain systems that protect us from physical danger (bleeding, tissue damage, and so on).

**Amygdala** — A part of the limbic system, it's the key processor in emotional response. It's been called our brain's 911 system and *the fear button*. It's composed of two almond-shaped structures located about an inch in from each ear lobe.

**Cortex** — The deeply folded, six-layer thick sheet of neural tissue at the top of our brain. It's approximately the area of a 12-by-18-inch sheet of construction paper and comprises 85 percent of our brain's mass.

**Cortisol** — A glucocorticoid (steroid) hormone released by the adrenal glands. It activates important body/brain systems that protect us from physical danger (such as bleeding and tissue damage).

**Dendrites** — Short, fingerlike extensions on neuron cell bodies that receive neurotransmitter information from other neurons. Neurons also contain an axon that sends information to other neurons at the synapse (a narrow gap between a sending axon and a nearby neuron's receiving dendrite).

**Endocrine glands** — Integrated groups of cells (such as the pituitary and adrenal glands) that prepare and release hormones into the bloodstream for distribution throughout our body and brain, where they affect a variety of activities.

**Hippocampus** — A structure that adjoins the amygdala in the limbic system. The two create a wishbone-shaped structure (like two adjoining, spread-out fingers) that straddles the index-finger-size brain stem and carries out librarianlike functions (selection and classification of remembered information). Think of the hippocampus as the pathway to the rational thought processed in the cortex. It's similar to a library's card catalog, which provides codes to help people find materials.

**Hormones** — See endocrine glands.



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**Hypothalamus** An olive-size structure in the limbic system that processes many regulatory functions related to our emotional life and safety. Think of it as our brain's internal sensory system. For example, it will signal us to drink water in response to a high concentration of salt in our bloodstream. It also plays a key role in regulating our body's stress response.

**Limbic system** The limbic system is composed of several interconnected structures that emerge out of the cortex and surround the brain stem. It plays important regulatory roles in emotion and in the selection and classification of long-term memories. Key interrelated structures are the thalamus and hypothalamus, and the amygdala and hippocampus.

**Neuron** See dendrites.

**Neurotransmitter** A molecule that is produced within neurons, it carries excitatory (do it) or inhibitory (don't do it) information to other neurons. Our brain has about sixty different kinds of neurotransmitters that individually and collectively process everything we do. Most of the sixty are peptides, relatively large molecules that process emotion.

**Pituitary gland** Located beneath the hypothalamus, our brain's master gland releases (among other things) a hormone called ACTH in response to stress signals from the hypothalamus. ACTH travels in the bloodstream to the adrenal glands that activate the complex stress hormone discharge characteristic of a stress response.

**Thalamus** A walnut-size limbic system structure that is located above the hypothalamus, the thalamus is the initial processing center for most external sensory information. The thalamus discovers what's happening outside our body and the hypothalamus, what's happening inside our body.



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# Discussion Questions

## Emotion

1. A strong emotion (such as anger, joy, fear) focuses our attention on the situation and can distract us from other important things. We may thus misplace or accidentally break something when we are angry, for example. Ask students to provide examples from their own lives. How can they enjoy or appreciate emotion and keep their wits about them? What strategies can they develop to cope with anger and fear?
2. Emotion is a response to things that have occurred and that will occur. Informally, discuss emotional events that have and will occur (birthdays, moves to other communities or neighborhoods, recent and upcoming tests), and students' reactions to them.
3. The text identifies intrinsic motivation, impulse control, mood regulation, empathy, and social competence as key factors in developing emotional intelligence. Following are brief explanations of three of these ideas. Design a class discussion around each of these using the guidelines in each discussion. Goleman's (1995) *Emotional Intelligence* is an excellent resource for background information. Overhead 3 on page 37 is a mindscape of some key aspects of emotional intelligence.

## Intrinsic Motivation

You are intrinsically motivated if you want to do something because it is important to you. List the forms of extrinsic motivation (doing something for external reward) such as pay for work, grades, gifts, bribes. Ask students to create individual maps of the activities they enjoy doing, activities they are intrinsically motivated to do. Then ask them to draw a wand and imagine they can create whatever they want in their future. On lines radiating from the wand, students write or draw all their wishes. Then from each of these lines, they branch out and record the emotions they would feel if these wishes were to come true and what they would be motivated to *do* to make them come true. Overhead 6 on page 43 is a mindscape you can use as a handout on intrinsic and extrinsic motivation. At the bottom of the mindscape is a space for students to record some of their intrinsic and extrinsic motivators.


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## Impulse Control

The ability to put some space between a stimulus and your response to it constitutes impulse control. Ask students to take part in a simple experiment. Offer them each a choice. They can have one piece of candy now or they can wait until tomorrow, when you will give them two. This experiment is not a test but an opportunity for students to notice how they *feel* when faced with such a decision. What thoughts went through their heads? How did they arrive at a decision? Did they respond without thinking much about it? Is this response, or decision, typical of their behavior? Ask the class to come up with a list of times when people must wait for something they really want. Discuss times when a feeling such as anger is so great that one acts without thinking first. This time is good for sharing information on page 8, which explains the way the amygdala functions and sometimes "hijacks" our more rational cortex.

## Empathy

To empathize with someone is to feel what he or she is experiencing. Emotion activities 7 through 10 (pages 27 through 29) can lead to discussions of how we know the way another person is feeling.

# Attention

1. Students who complain about boring school activities will happily spend extended periods of time playing video games, talking to friends, shooting baskets, and so on. Ask your students to discuss why some activities excite and hold attention more than others.
2. Our attentional system is biologically tuned to high contrast and rapid movement, rather than to similarity and static states. Sometimes we like to stand out from others and other times we like to blend in with the crowd in how we act and in what we wear. Discuss the concepts of contrast (such as black print on white paper, our greater attention on a fluctuating ambulance siren than on a steady tone) and movement (such as our tendency to notice a moving fly but not a still fly, the appeal of sports and games that emphasize movement). Video games tend to combine rapid movement and high contrast. Discuss such interesting elements of our attentional system.
3. Our childhood sleeping/waking cycle often shifts during early adolescence to later sleeping and waking (sort of permanent jet lag). It also often shifts over the weekend. It can be affected further by emotional events that keep us awake at night. Discuss elements of this issue and seek *practical* application in school and home that might reduce the negative effects of such shifts (given that your class can't unilaterally change the school schedule). You might introduce a guided visualization exercise from side 2 of the audiotape to give students strategies for falling asleep at night.



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# Teacher-Directed Activities

## Emotion and Attention Poster Activities

The following activities serve to entice your students into their study of emotion and attention. You might decide to do all of them or to pick and choose. You might want to photocopy the pages, laminate them so they remain presentable, and keep them in a binder or card file for use in future years. Add your own activities as you think of them. You might even want students to make an audiotape or poster for you to use in future years.

**Step 1:** Place the poster on a wall of your classroom. Ask students to take time to study the words, images, colors, and patterns.

**Step 2:** Ask students if the young man's face caught their attention and, if so, why. You might hear such answers as, "His hair is so unusual"; "He looks cool"; or "He looks like someone I know."

**Step 3:** Our attention usually takes some time to gravitate to the smaller elements of the poster, but if we have an emotional reason to notice these elements, we'll notice them sooner. You may say to your class, "If you knew that someone would give you a dollar for every star you found on the poster, what would you suddenly notice? If the reward were $100 per star, would you focus your attention to a greater degree and discover additional stars? Suppose you were a collector of butterflies. What would you notice about this poster?" Ask students to notice the stars and butterflies and count them.

**Step 4:** You might engage students in an attention activity in which they imagine that they are the following people viewing the poster:

- *graphic designer*
- *printer*
- *paper manufacturer*
- *painter*
- *person who loves the color red*
- *person who has enjoyed many wonderful days at the beach*
- *manufacturer of beach chairs*
- *person who studies insects, particularly ladybugs*
- *hair stylist for rock singers*
- *young woman who is feeling very sad*



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- *person who just fell in love*
- *person who has just studied the meaning of* intrinsic motivation *and has the phrase coming up on a vocabulary test*

Notice that people have unique emotional connections that influence what elements of the poster grab their attention. Ask students to share what they noticed from the various points of view they adopted.

**Step 5:** Expand the previous activity by asking students to close their eyes, then describing a role for them, such as "You are an engineer who has been called in to examine this room for structural faults"; "You are a one-hundred-year-old person who hasn't been in a classroom for the last eighty years"; or "You are allergic to seeing the color red!" Students open their eyes, look around, and note what stands out for them that they didn't see before.

**Step 6:** Tell students something similar to the following: "The young man in the poster is wearing glasses to symbolize an important aspect of emotion. The way in which we view the world and the way we think about our lives are colored by our experiences and beliefs. If you are having a bad day, it is like looking at the world through dark glasses. Everything you look at seems dark. People or activities that normally bring you joy fail to do so on a 'dark day.' The important thing to remember on such a day is that your feelings, your emotional state, have an impact on the way in which you see the world. The world is colored by our perspective of it. And our perspectives change as our emotions change. If you decide to look through lenses of gratitude, for example, you might see the world in an entirely different way."

Ask students to list everything they are grateful for, including things they might usually take for granted, such as having a healthy body or living in a home that is warm in winter. Then ask them in what ways, if any, making the list made them feel better. Some people have a temperament, a way of being in the world, that includes being grateful and happy most of the time. Others have a temperament that is less positive. However, everyone can consciously shift their lenses from dark to rose colored by noticing the good in their lives.

**Step 7:** Consciously shifting one's attitude can really make a difference. Ask your students to close their eyes. Tell them something similar to the following: "You probably haven't been aware of your eyesight today. Most of us take it for granted that we open our eyes in the morning and can see. But imagine you are without sight. You have been blind for the past year. You haven't seen faces of any friends or family members. You haven't seen your own face, any movies or TV shows; you've seen no posters, album covers, flowers—nothing. When you open your eyes, you will be able to



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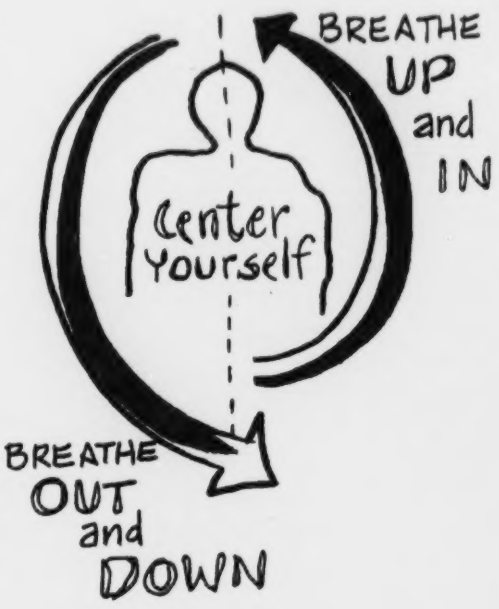
see—you can see whatever you want to see. Now open your eyes and take a look around." Ask students to write down or draw pictures of items that stood out for them, or to record the feelings they experienced.

**Step 8:** Ask students to notice the question on the poster, "How are you really feeling?" Answering this question might seem easy; however, most of us go through our days without taking time to check in and notice how we are feeling, unless we are experiencing an extreme emotion. Ask students to notice how they are feeling in their bodies. Do they feel centered and aligned? If they are sitting, ask them to find a way to sit that feels balanced, centered, and relaxed. Ask them to close their eyes and imagine that they are being supported by the earth below them. Ask them to breathe out, letting themselves sink and feel the support of the chairs or floor they are sitting on, to feel the support of the earth. As they breathe in, ask them to think of themselves lifting up.




On side 2 of the audiotape is a series of guided visualizations. Each visualization begins with a process for focusing attention on the breath. You might want to play these for your students to help them focus their awareness.

**Step 9:** The poster lists the basic eight emotions. The audiotape also introduces these basic emotions. Ask students to brainstorm as many different emotion-oriented terms as possible and list them on the chalkboard. Then list the eight basic emotions, and ask students to suggest which emotions in the list might be blends of two or more of the eight basic emotions.

**Step 10:** After the poster has been up for a week or more, remove it. Divide the class into small groups and ask them to re-create the poster by drawing what they remember and writing the key words. This activity will help them review the key concepts and practice recall.

## The Emotion and Attention Audiotape Activities

On side 1 of the audiotape is a series of dramatic pieces that introduce concepts about the way our brain responds through emotional and attentional systems. (Display overheads 4 and 5, pages 39 and 40, while students listen to this side of the audiotape.)



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Many of the basic concepts that are described in this booklet are introduced to your students on the tape. Students can look at the overheads while they listen to reinforce the information and to review later.

If your tape player has a counter, you might find it useful to set it at 000 when you begin the tape. Record the numbers for the beginning of each section for future reference. Side 1 is 35 minutes long and includes the following:

- conversation between scientists
- success and emotional intelligence exercise
- empathy exercise (listen for the feelings behind the words)
- intrinsic and extrinsic motivation (conversation with a student)
- amygdala and hippocampus conversation
- activity of listing emotions and debriefing
- strategies for focusing on the present

Side 2 has five guided visualizations:

- relaxation and guided voyage to a cabin
- relaxation and imagining success in the future
- relaxation and reduction of physical comfort
- guided journey to the beach and meeting with a wise teacher
- high technology journey to your special screening room

## Ongoing Journal Activity

To integrate the awareness of emotions into classroom activities and to assist students to develop emotional intelligence, you might create a journal for each student. The journals can be simple spiralbound notebooks set aside for recording thoughts and feelings. Throughout your study of the emotion and attention systems, allow time for students to reflect and record their thoughts in writing. If a particularly emotional event occurs in class or a difficult moment comes up, allow time for the students to reflect and write.

You often need only three or four minutes for an exercise in which everyone is asked to write in their journal the answer to three questions: What just happened? How am I feeling right now? What do I want? The journals are personal; assure students that they will not be required to share their journals with anyone. Simply taking the time to reflect, notice, and record can be extremely useful in developing self-awareness.



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# Student Exploratory Activities

We have printed the following activities two to a page when possible to facilitate photocopying. You might choose to make several copies and hand these out to your students. Or you may laminate one copy and pass it around. Whichever method you choose, we suggest that you keep a file, either in a binder or a card file, of these activities for easy reference and to add to over the years. (Note that overhead 7, page 45, is designed to be used with emotion acivity 1.)

Ask individuals and groups of students to organize and adapt the following activities that explore and report on various dimensions of our emotional and attentional systems. Also encourage them to develop their own emotion and attention explorations. After any class activity, ask students to take time to debrief. Ask them to reflect silently and write responses to such questions as How much did I participate? How did I feel about the assignment when it was introduced? What emotions did I experience as we went through the activity? What emotions did I notice others exhibiting?



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# Emotion Activities

## The Mood Game

Place your classmates into three groups; each group will focus on one of the following:

***Emotion:*** What you are feeling right now (for example, joy, grief)

***Mood:*** Feeling that persists for hours/days (for example, gloomy, cheerful)

***Temperament:*** Something that emerges early in life and persists throughout life (for example, anxious/inhibited, bold/uninhibited)

In your groups, discuss and research your topics and answer questions such as the following:

- What various forms does your topic take? For example, how many types of emotion can you identify? Of mood? Of temperament?
- What clues do you use to identify another person's emotion, mood, or temperament?
- How do you identify these elements in yourself?
- What clues would you use to characterize the emotion, mood, or temperament of your family members?
- What examples from history, current events, or stories from your own lives display aspects of emotion, mood, or temperament?

Your group may also use pictures and symbols to create a poster that represents your insights into their topic.



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# Emotion Activities

Activity 2

## The Environment Experiment

The classroom environment can affect your emotional life. Explore the effects of gradual adaptations, such as those listed below. In each case, gather daily data on your classmates' feelings to discover how long it takes for each situation to become emotionally unsatisfying. Then come up with ways to improve your classroom in each area.

### Crowding

Place dividers along a wall, then move them one foot farther from the wall each day to reduce the working area of the classroom. Note how you feel as you move your desks closer and closer together. After your study, experiment with moving furniture in the room to discover what arrangement makes you and your classmates feel most comfortable. Discuss different preferences.

### Clutter

Work out an arrangement with the custodian, asking him or her not to clean the room for several days; allow wastebaskets to fill, don't erase chalkboards, and so on. Report your responses to the room, noting that these will vary from student to student. With your classmates, clean the room when the experiment is over and decide how to keep the space tidy enough for everyone to feel comfortable and able to learn.

### Noise

Record an hour or so of the sounds of a busy street or other such noise. Play the tape during class while your classmates are working on a silent assignment (such as reading or writing). Ask classmates to bring music that they enjoy and play it in the background. Survey and report on which types of music help the most students concentrate and learn. Baroque music often helps people learn well. Nature sounds, such as ocean waves and the rain forest, can also positively affect the emotional tone of a room. You might also experiment with various scents, which also affect emotion.



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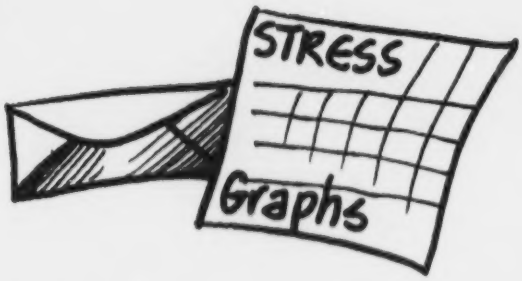
# Emotion Activities




Activity 3

## Stress Graphs

Record and graph daily stress levels of your classmates for at least two weeks. At the beginning of each day, ask your classmates to write on small slips of paper a numeral that indicates how they feel that day and to place the slips in a box (10 is high—I feel very good; 1 is low—I feel very bad; the other eight numbers represent intermediate emotional states). Place each day's slips in a sealed envelop, labeled with the day. Keep a record of emotionally laden events, such as changes in weather and arguments, that occur each day. Wait until the end of the project to work with your teacher and classmates to compute and graph the average daily results so that the previous day's averages don't influence student's responses on any given day. Note patterns and fluctuations over the period and use the recorded daily events to explain high and low days, variations between Monday and Friday, and so on.

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# Emotion Activities

Activity 4

## Music

Emotion is central to music, and we tend to collect tapes and CDs and choose favorite songs because they evoke an emotional response of some kind. Sign up for a day (one student each day) on which you will bring to class and play your favorite song; lead the class in a short discussion of its emotional significance.



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# Emotion Activities

## Lyrics and Poetry

Ask classmates to bring or write the lyrics of a favorite song. Cut up the lyrics so that one word or phrase is on each piece of paper. Ask classmates to rearrange the emotionally evocative words to create new poems. Discuss which words have the most emotion attached to them and what images or associations they bring to mind.

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# Emotion Activities

## Short Stories

Individually or with one other classmate, compose a short story that includes two or more people who have emotions, moods, or temperaments that differ greatly. As an alternative, you may choose a short story and dramatically read the scenes that represent various expressions of emotions, moods, and temperaments.



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# Emotion Activities

## Basic Eight

Place your classmates in groups of four. For each group, write each of the eight basic emotions (see page 7) on a separate slip of paper. Ask your classmates to select a slip, then to express the emotion with the face or the body. The others in the group try to guess the emotion. Note which emotions were guessed and not guessed. When the groups have gone through all the slips, reconvene, compile the scores, and discuss which of the emotions were the most and least easy to express. Discuss how you knew which emotion was being expressed. Overhead 1 is a mindscape of the basic eight emotions and the blends they create.

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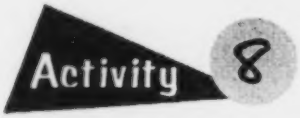
# Emotion Activities



## Express Yourself

Place your classmates in teams of three. Ask each team to select an emotion to express to the class in three different ways using various body parts, props, music, dance, poetry, mime, or art.



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# Emotion Activities

Activity 9

## Taking Charge

This activity is based upon the early work of Robert Fritz, author of *The Path of Least Resistance.* The lists will enable you to consider the degree to which you can take credit for what you create in your own life. Such activities will help you become creative and proactive.

List ten things in your life that you like (relationships, activities, possessions, and so on). List ten things in your life that you don't like. Rewrite the second list, making each negative statement a positive one. For example, you might rewrite "I don't like the way I fight with my brother" to read "I get along well with my brother." Write the heading "Ten things I have created in my life" above the first list and "Ten things I want to create in my life" above the second list.

Discuss this topic with your classmates by asking questions such as the following:

- **In what ways can we make things happen in our lives?**
- **How can we choose how we feel rather than allowing other people to make us feel certain ways?**
- **How can we make a difference in our relationships with others?**



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# Emotion Activities

## Making a Difference

Select one person with whom you have a relationship that makes you sad, angry, or afraid. Choose or design an experiment that enables you to determine if you can improve the relationship. Select a behavior (something that you will do differently) and a measure (a way to determine if the relationship is changing). For example, if your neighbor is grumpy, you might decide to experiment with smiling and saying hello to her. You could plan to stop once a week and talk with her for a couple of minutes. Or if there is someone who seems unfriendly at school, experiment with sitting by that person at lunch. The measure of your success could be how you feel around that person after one, two, and three weeks of the experiment, or it might be the number of times that person talks to you in a friendly way or starts a conversation.

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# Attention Activities

## Focus on Change

Our brain normally doesn't attend to subtle changes, so we miss many interesting things. Ask classmates to identify and attend to an interesting square foot of space at home or in school. Ask them to (1) describe it carefully on a page in a journal and (2) return to it at the same time and day each week for ten weeks to note and describe differences that occurred. You may photograph your space, then show slides in sequence to your classmates to point out and explain the changes that occurred.



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# Attention Activities

Activity 2

## Guesstimate

Our imprecise brain is very good at quickly estimating quantities and sizes. Ask teams of classmates to create several booths and place a collection of objects in each booth. A table full of leaves, a quart jar full of marbles, a spread-out page of a newspaper, a stack of paper are all possibilities. Ask classmates not on your team to enter your booth, examine the objects for ten seconds, estimate the number of objects, and write down their estimates on slips of paper, placing them in a box. When everyone has completed the task, tabulate the results. Compare your results to those of other teams to see which booth had the most and least accurate estimates. Have a class discussion about what you discovered: Why are some kinds of collections easier to estimate than others? What estimating strategies did people use?

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# Attention Activities

Activity 3

## Extrapolate

With a team, create an experiment in which your classmates guess what something familiar is when you make only a small amount of information available. For example, cover a familiar picture with a sheet of paper with three one-inch holes cut out. Or play five seconds of a popular song. Or place a sheet of paper with a 1-by-5-inch rectangular, vertical hole in it over a class textbook.



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# Attention Activities

Activity 4

## Guess Who

An activity related to activity 3 focuses on subtle changes over time. Ask classmates to bring in one of their baby pictures each and place them in a box without showing them to anyone. Display the pictures by number, and ask classmates to identify one another. Tabulate the results. Which photographs were the most and least easily identified and why? You might also talk several teachers into contributing their baby pictures to the activity to make it more interesting.

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# Attention Activities

Activity 5

## Image Flash

With several classmates, photograph several scenes that have at least a dozen recognizable objects in each. Flash each slide of the scenes on a screen for five seconds, then ask other classmates to quickly jot down up to five objects they noted. Then move on to the next slide. Tabulate the responses to discover which objects were most and least mentioned. Discuss the response patterns while looking at the slides again.



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# A Final Note

**This kit has been designed to enable students to learn about emotion and attention through a variety of engaging, multisensory activities. The overheads that follow are** intended to help you do so. (You may use them as handouts, as well.) We trust that you will create your own adaptations and variations and invite you to contact us to share your ideas and applications. In this manner we, as adults and colleagues, can continue to learn from one another.





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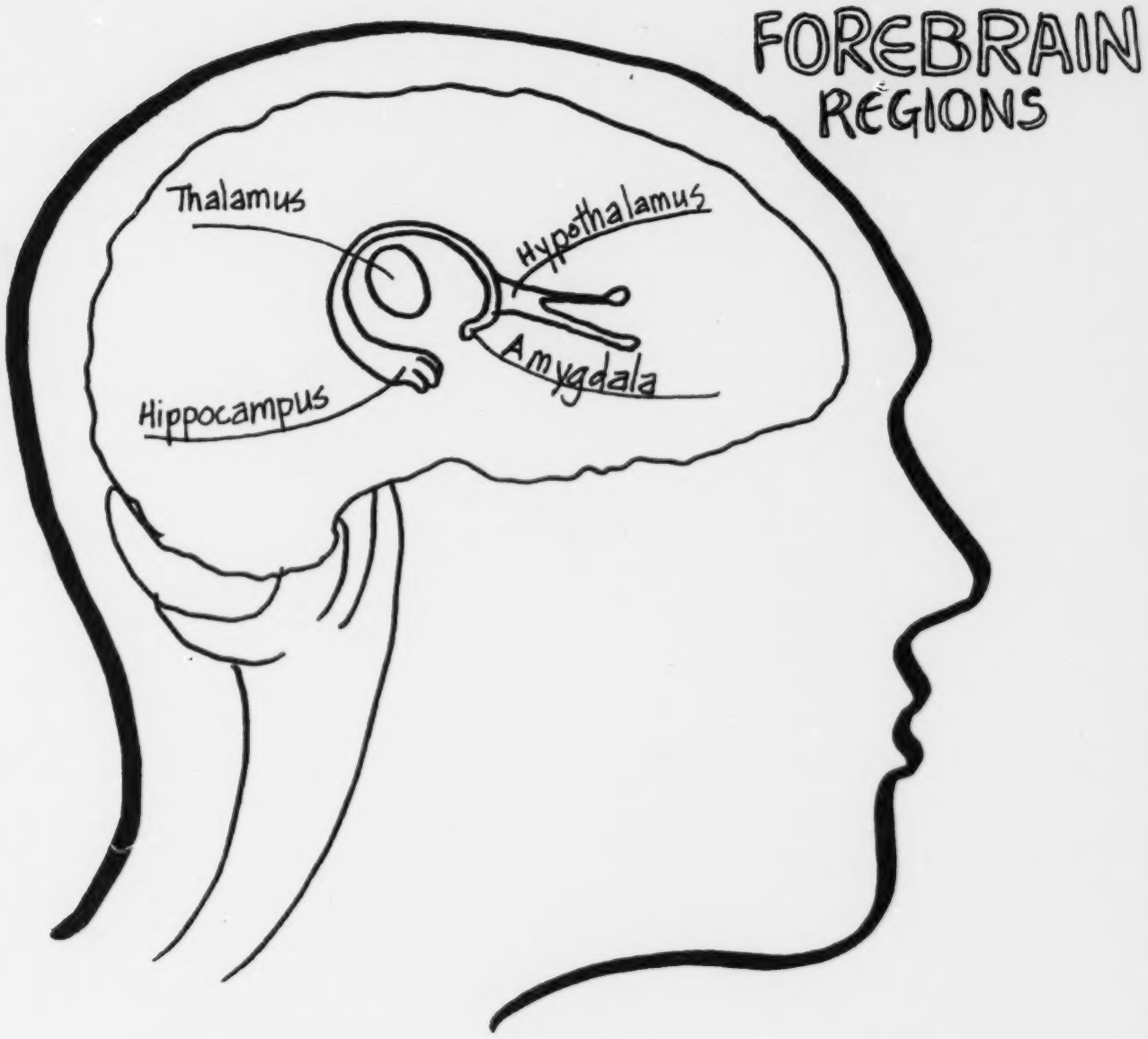
**Overhead 1**

Disgust
ANGER
ANTICIPATION
Blend:
ANXIETY
Sadness
FEAR
BLEND:
GUILT
Surprise!
Blend:
ALARM
BLEND:
LOVE
JOY
Acceptance
35

## Overhead 2



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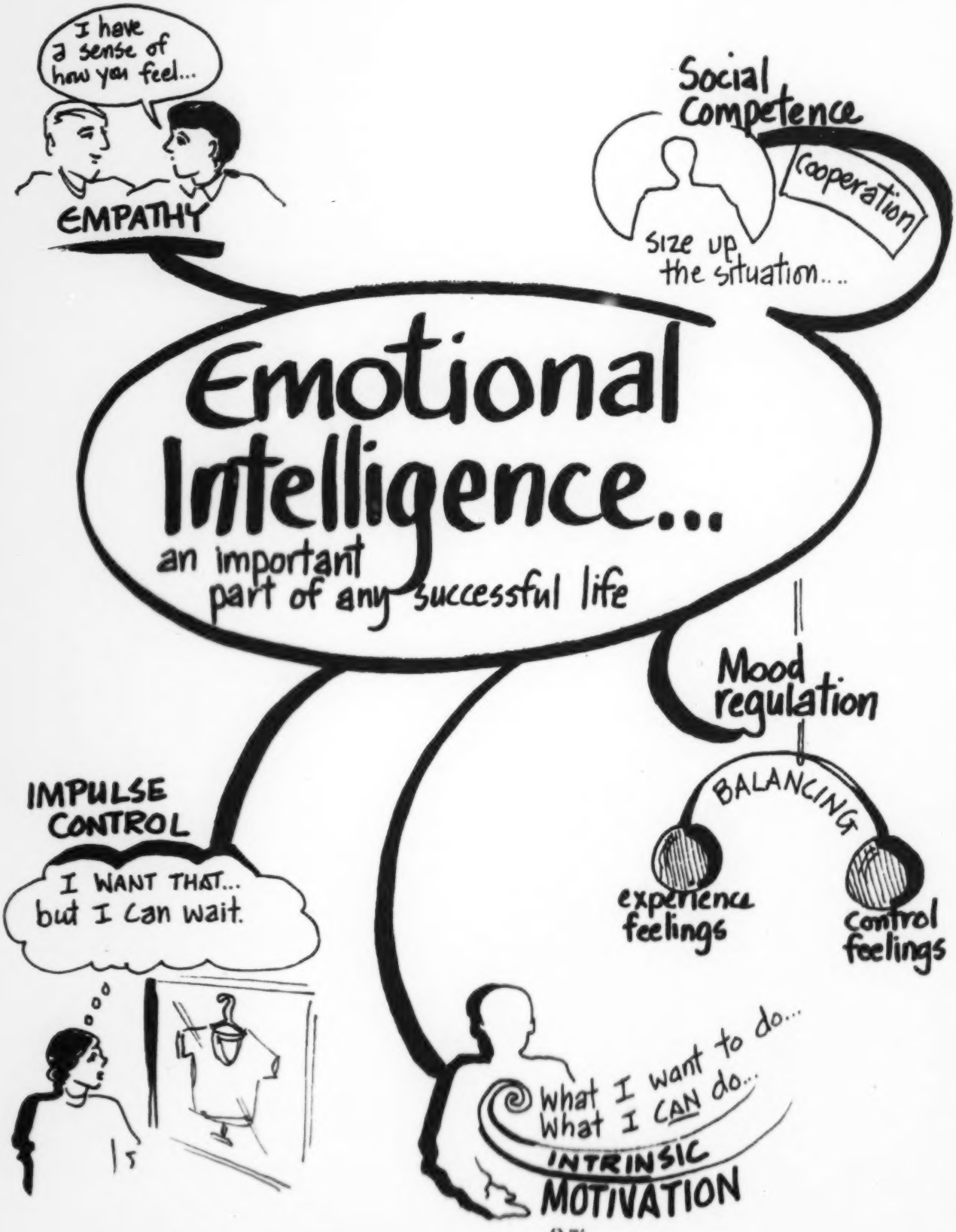
Overhead 3



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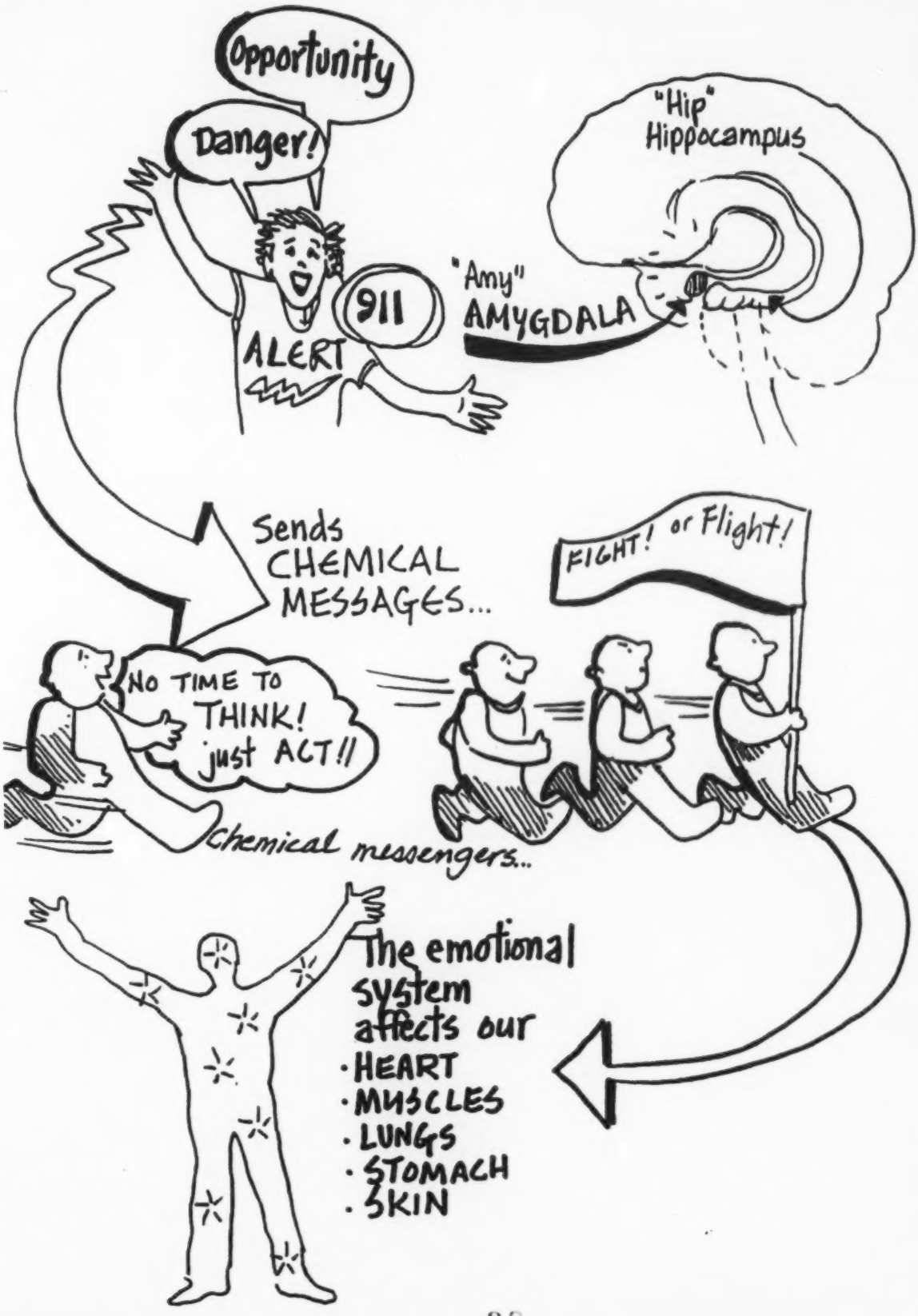
## Overhead 4



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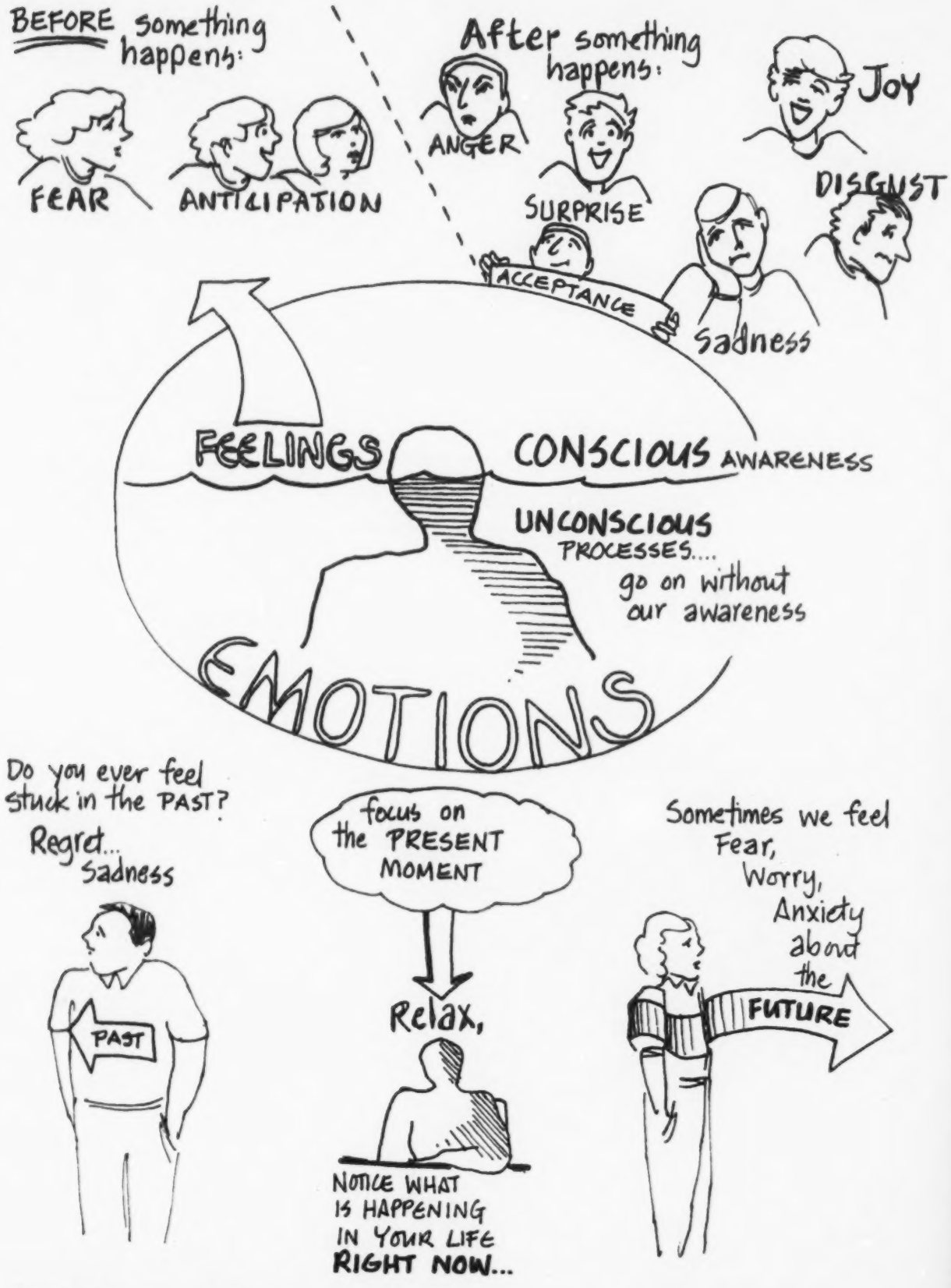
## Overhead 5

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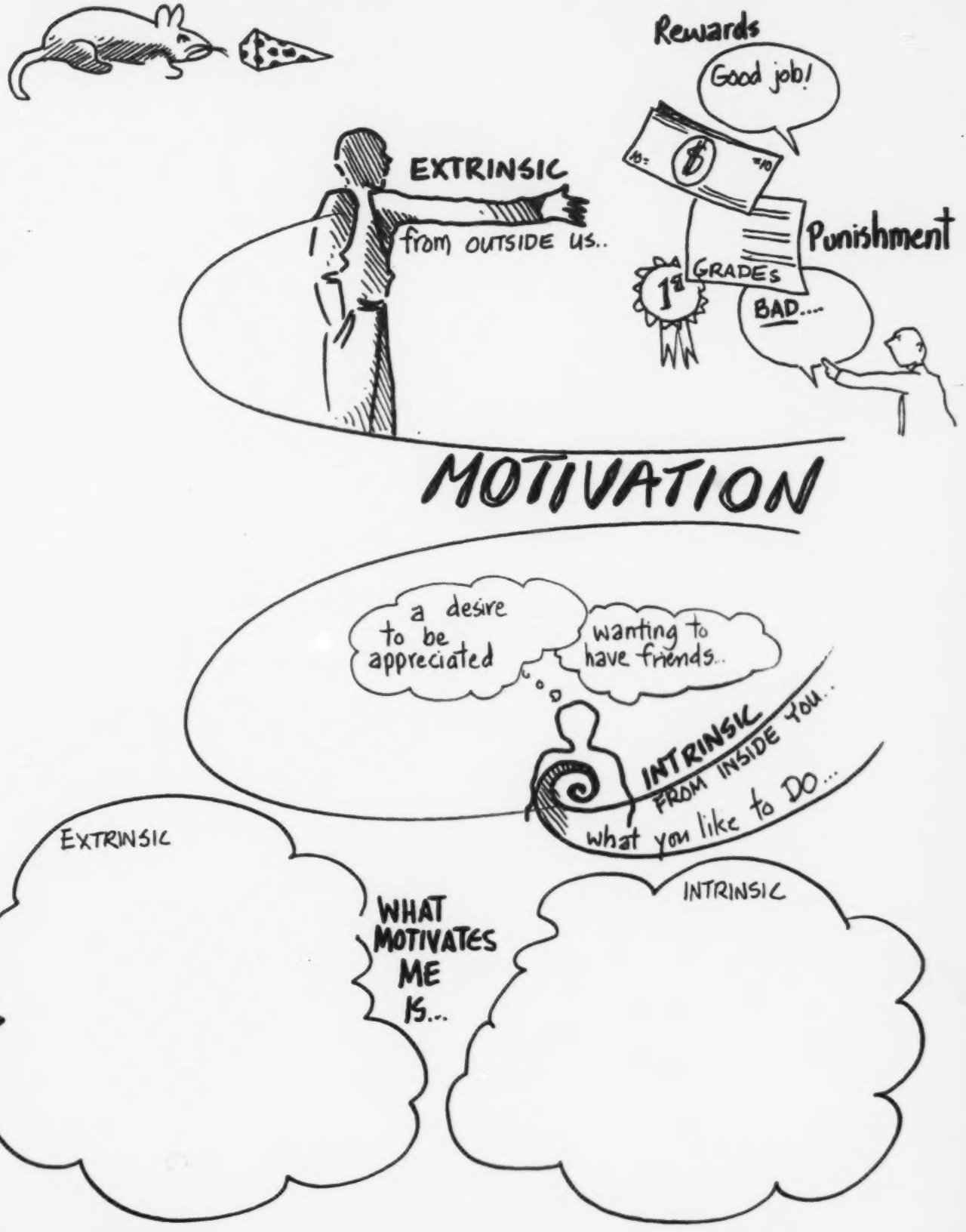
## Overhead 6


Rewards
Good job!
EXTRINSIC
from OUTSIDE us..
Punishment
GRADES
BAD....
MOTIVATION
a desire to be appreciated
wanting to have friends..
INTRINSIC
FROM INSIDE You...
what you like to DO...
EXTRINSIC
WHAT MOTIVATES ME IS...
INTRINSIC

**Overhead 7**

worried
sad
Mad!
HAPPY
Surprised!
EMBARRASSED
EMOTION
What is occurring right now...
I'm in a good mood today
OCTOBER 7
SUNDAY
MONDAY
TUESDAY
MOOD
Feelings that persist for hours or days...
I was in a bad mood all afternoon!
GLOOMY... Cheerful...
WORRIED...
PREOCCUPIED...
TEMPERAMENT
a way of feeling that is part of your personal style, from childhood on...
ANXIOUS
BOLD
OUT GOING
Shy

# Useful Nontechnical Resources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## About the Creators

Nancy Margulies's unique [illegible] mindscaping, enables [illegible] in a strong that clearly [illegible] relationships and patterns. She's the [illegible] including *Mozart Marathons* and *Mozart* [illegible] comic books, including *[illegible]*

Robert Sylwester [illegible] at the University [illegible] the cutting-edge [illegible] brain development [illegible] *Brain* [illegible] *Brain Development* [illegible] *Brain* [illegible] author of *Wonder* [illegible] *Mozart* [illegible] *Brain* [illegible]

## Discover Your Brain Kits

Show students how our brain makes [illegible] visualization, music, and other elements [illegible] leading expert in education and brain [illegible] creates an engaging approach to learning [illegible]

The kits include comprehensive [illegible] authoritative and interactive [illegible] about memory and reproducible [illegible]

### Memory Kit

This kit instructs students in [illegible] brain stores information. It also helps [illegible] understand their own cognitive [illegible] teaches them effective ways to remember [illegible]

### Emotion and Attention Kit

Students learn how emotion drives attention and attention determines what they remember. [illegible] also learn how to harness emotion to help [illegible] them remember.

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